



Maytech MTB, MTA V2 & MT180A-HV ESCs Users' Manual (v2.0)

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Important Precautions:

- ★ Read the manual correctly before your operation.
- ★ Wrong polarity connection will damage the ESC.
- ★ Do not use any substandard cable connector, plug or socket.
- ★ Do not allow any unqualified battery pack.
- ★ Do not exceed the ESC voltage and current limit.
- ★ Do not disassemble any electronic components of ESC, or else it will cause permanent damage or information losses.
- ★ Do not leave soldering tin or water on the ESC.
- ★ Do not take the battery away when motor is rotating, or else it may cause high burst current to damage ESC.
- ★ The electric wire should not exceed 20cm (between ESC and battery), if over 20cm, it is necessary to weld a high frequency capacitor between positive and negative line at every 20cm. In case the motor wires need to be extended, please twist the 3 motor wires together to avoid transmitter interference.
- ★ The ESC should be in a position which allows good airflow and heat dissipation.
- ★ Use of this speed controller is allowed only in situations where damages and personal injuries are impossible. A damaged ESC (e.g. broken, damaged by polarity inversion or humidity) must not be re-used under any circumstances.
- ★ The ESC may only be powered from batteries, not from power supplies.
- ★ Disconnect the battery from the ESC when not in use.

I. Specification: (Programmed by TRX or by our ProgCard)

| Model No. | Current | BEC | Li-Ion/Li-Po | NIXX |
|-------------------|---------|---------|--------------|-------|
| MTB-60A-SBEC-V1 | 60A | 5.5V/6A | 2—6 | 5—18 |
| MTB-80A-SBEC-LV | 80A | 5.5V/6A | 2—6 | 5—18 |
| MTB-100A-SBEC-LV | 100A | 5.5V/6A | 2—6 | 5—18 |
| MTB-150A-SBEC-LV | 150A | 5.5V/6A | 2—6 | 5—18 |
| MTB-100A-OPTO-HV | 100A | NO | 4—12 | 12—36 |
| MTB-120A-OPTO-HV | 120A | NO | 4—14 | 12—42 |
| MTB-180A-OPTO-HV | 180A | NO | 4—14 | 12—42 |
| MT180A-OPTO-HV-V1 | 180A | NO | 4—14 | 12—42 |

NOTE: BEC--Battery Eliminator Circuit; SBEC--Switch mode BEC;
HV--High Voltage; LV--Low Voltage; OPTO--NO BEC.

II. Features:

- ★ Under-voltage detection (can be switched off)
- ★ OPTO Coupler
- ★ Programmable Soft Start-up
- ★ Programmable "Forward/Reverse mode" or "Forward mode" (for boat ESC)
- ★ Active free-wheel (Automatic rotation). ESC can keep cooling and reduce heat.
- ★ Timing: Automatic or 6 steps adjustable
- ★ EMF brake adjustable
- ★ PWM frequency: 8-16KHZ
- ★ Max. RPM: 240,000rpm (for 2 Poles Brushless Motor)
- ★ Over-temperature protection and Overload alarm

If ESC's temperature exceeds its limit because of overloading or lack of cooling, a warning signal (3 Beeps with interval) is issued after landing and/or motor stop. If ESC makes repeated temperature warnings, better cooling should be provided or current should be reduced. (Motor cannot be stopped when in use, unless the temperature becomes extremely critical.)

- ★ Anti Sparking Circuit: reduces connection sparkles (only HV ESC)

III. Initial Startup Procedure:

1. Connect the Motor to the ESC
2. Connect ESC to receiver
3. Connect ESC to battery



4. Turn on Transmitter; you will hear 3 descending tones.
5. Then, follows a number of beeps according to battery cells. (2 continuous quick beeps with 2S battery, 3 continuous quick beeps with 3S battery, 4S, 5S, 6S, and so on). If battery cells are over 6 (6 to 14 cells), there will be 2 high-pitch beeps and 2 low-pitch beeps.
6. In case the transmitter stick is in throttle off position (If Gun-type transmitter, stick must be at standby position), you will hear 3 ascending tones.

Now, The ESC is ready to work!

If there are no 3 ascending tones, please correct the throttle off position of the transmitter, by Prog-Card or transmitter, till you hear 3 ascending tones. Please refer to the *Instructions of Programming ESC by Trx*.

NOTE:

★ Helicopter settings:

For helicopters in governor mode, the full throttle range (100%) must be calibrated once. For some transmitters, this range is indicated in the helicopter menu (throttle curve 0-100%) and some other transmitters -100...+100. When activating one of the governor modes, all relevant heli parameters are set to default. This default will fit all setups. You don't need to program further.

★ In case you get in programming mode during initial start-up (throttle stick at highest position), simply disconnect the battery, lower the stick to throttle off position, and connect the battery again.

★ To have a successful recognition for Li-Pos over 3 cells, the battery pack should always be fully charged! Otherwise, it can happen that a cell is missed and thus the under voltage protection would trigger too late. We recommend setting the number of cells with Prog Card.

IV. Trouble shooting:

- ★ 2 Beeps/flashes: Under-voltage detection
- ★ 3 Beeps/flashes: Over Temperature Warning
- ★ 5 Beeps/flashes: Receiver signals failed
- ★ 6 Beeps/flashes: start up failed

Any error happens during flight is signaled by warning sounds from motor or flashes of LED. 2 beeps or 3 beeps will occur after motor stops but not stored. In case the ESC is switched off by error, the 5 beeps and 6 beeps will be stored permanently even cut off battery and re-start. To delete these errors, please connect the ESC to the battery with 100% throttle pre-selection (throttle curve) or with the stick at full power, then disconnect the battery after the interval beeps. You may activate the programming mode by Transmitter if not disconnecting the battery.

V. Instructions of Programming ESCs by Trx:

1. Basic-Setup:

The basic setup goes very quick. You should read this Manual thoroughly before running it.

- 1). Make sure the ESC is off, and then switch on the transmitter with the throttle stick at **highest position**.

2). Connect the ESC with motor and battery pack => continuous beeps should be heard *~~~~~*, move the stick to the desired position during the beeps; if no Brake, put throttle stick to **lowest position**. If the Brake is needed, lower the stick to **one fifth away** from the lowest point, you will hear two beeps (high and low pitch *♪♪*) to confirm throttle stick position. Then the throttle calibration is saved. (NOTE: For helicopters the best is to move the stick in lowest position!)

- 3.1). If do not move throttle stick and wait for a *♪* sound. The "Soft Start" is activated (for helicopter).

- 3.2). If move throttle stick to highest position, you will hear a *♪*, and then move stick to lowest position, a *♪* will be heard, the "Plane Fast" is activated (for Airplane).

NOTE: with brushless motors, very fast response times will draw higher current than in steady operation! Therefore this setting should be adjusted carefully. This very fast response is allowed only as occasion requires.

- 4). Then you will hear the beeps according to battery numbers.

- 5). You will hear 3 ascending tones, means the ESC is ready to work.

NOTE: For helicopter, it is important that for auto rotations trainings the throttle can not be put to the lowest position! Otherwise an extremely slow normal soft start will takes place again in the case of an autorotation abort, which eventually may lead to crash. Thus, the motor needs a certain remaining rpm, so that the ESC will not consider it as a fresh start.

2. Advance-Setup:

For the Advance Setup, Basic Setup must have been performed at least once!

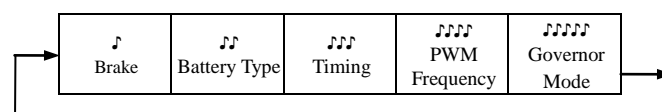
- 1). Make sure the ESC is off, and then switch on the transmitter with the throttle stick at **highest position**.

2). Connect the ESC with motor and battery pack => continuous beep should be heard *~~~~~*...

- 3). After approximately 20 beeps *~~~~~*..., the advance setup is activated. Acknowledgement beeps *♪♪* => Advanced Setup.

Then put throttle stick to **lowest position** and you will hear the beep indicating the menu.

★ Main Menu:



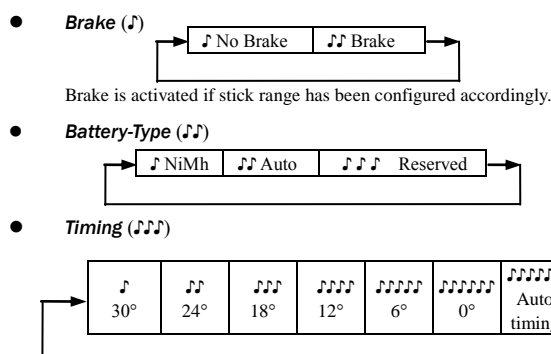
Move the stick to **highest position** after hearing the beeps for the desired main menu and you will hear Acknowledgement beeps *♪♪*. Then put the throttle stick to **lowest position**, enter sub-menu.

NOTE: If any parameter has not been selected, the menu will begin again with "Brake" and so on; If selected, depending upon the selection now the ESC switches to the setting of the Parameter.

After the setting of any sub-menu, moving the stick back to **highest position**, you will hear *♪*, the ESC is ready to work.

If you would like to program other parameters, pls disconnect ESC from power and reconnect. This applies to each programming step.

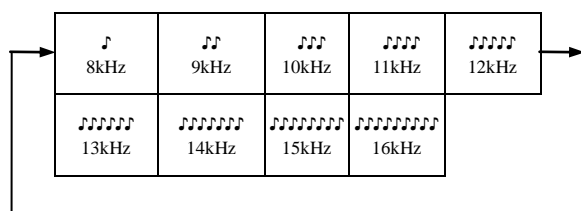
★ Sub Menu:



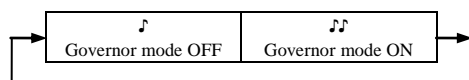


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● PWM-Frequency (♪♪♪♪)



● Governor Mode (♪♪♪♪)



After programming the ESCs, the ESC will memorize the current speed at next start. It is therefore important to wait until you can notice a small speed jump indicating that the governor mode is activated.

NOTE: The beep starts always with the current setting. This gives a way to send a feedback to the ESC settings.

VI. Instructions of Programming ESCs by Progcard

Factory Default Value:

| Item | Default value (Boat ESC) | Default value (Airplane/Heli ESC) |
|-----------------------|--------------------------|-----------------------------------|
| Timing | 12° | 18° |
| Brake | Middle | Off |
| Cut-off/AccuType | Slowdown/Lipo | Slowdown/Lipo |
| Cut-off Type | 3.1V(LiPo) | 3.1V(LiPo) |
| Cells | Automatic | Automatic |
| Special Function | Rev.(Navy) | None |
| Act. Freew./Gov. Mode | Freew off/ Governor Off | Freew on/ Governor Off |
| Gov. Mode/P-Gain | 0.9 | 0.9 |
| Gov. Mode/I-Gain | 0.05 | 0.05 |
| Start-up Speed | Plane Middle | Heli Middle |
| PWM Frequency | 12KHz | 8KHz |
| Startup Power | Automatic | Automatic |

With MayTech programming card, you can program ALL parameters, easier and convenient.

1. Disconnect battery and motor from ESC. Disconnect ESC signal wire from receiver.
2. Plug ESC program wire to left connector of prog-card. The left contact is signal (white, yellow or orange), the center contact is +5V (red), and the right contact is minus (brown or black). Do not plug the connector the wrong way.

★ For OPTO ESC,

Step1: Connect progcard to throttle channel of receiver via extension wire of progcard. Make sure receiver has power. Then, you can see upper LED of the lateral LED-column light.

Step2: After 4 seconds, all LEDs will light up in sequence, in one cycle.

Step3: Connect motor to ESC; Connect battery to ESC. You will hear 6 Beeps from motor.

Step4: Push "Enter" button. All LEDs will light up again in sequence, in one cycle. **You are now on level 1**, starting with the timing indicator.

★ For BEC ESC,

Step1: Connect motor to ESC; Connect battery to ESC. You will hear 6 Beeps from motor, and upper LED of the lateral LED column will light up.

Step2: Shortly, the current settings are read from the ESC. All LED will light up in a sequence, in one cycle. **You are now on level 1**, starting with the timing indicator.

3. Now program parameters on level 1:

Step1: Press the lower left button to choose the item.

Step2: Press upper left button to choose the value you require.

Step3: Press "Enter" button on the right. The motor makes a sound (♪♪) to confirm the change has been saved. At the same time, ESC LED will light once.

If any functions cannot be programmed, you will hear a low tone ♫.

1) **Timing** (0°, 6°, 12°, 18°, 24°, 30°) (Basic rule: the higher the timing, the higher the full power rpm.)

NOTE: If you would like Auto-timing, pls choose "Auto-timing" in "Special Function". If no automatic timing is enabled, it can be adjusted according to the following guideline. Inrunner: 0 to 12°, Outrunner: 18 to 30°. If your motor manufacturer recommends a timing value, it is preferable to use it.

If erratic or abnormal sound heard during motor acceleration, motor timing must be increased. If no improvement obtained at 30°, the motor is overloaded. Then smaller propeller, or smaller-volt battery or a stronger motor will help.

2) **Brake** (Off, Arco, Acrohard, smooth, middle, hard)

NOTE: smooth, middle, hard are only for folding propellers!

3) **Cut-off type**(OFF, Slow down, Cut-off) / Accu type(NiMh, LiFe, Lipo)

★ **OFF:** means no cut-off setting;

★ **Slow down:** ESC reduces motor power when the pre-set cut-off Voltage value reached (recommended).

★ **Cut-off:** ESC instantly cuts motor power when pre-set cut-off Voltage value reached.

★ **NiMh:** In NiMh mode, neither the cutoff voltage nor the cell number needs to be programmed. The slowdown is done automatically based on the battery voltage during connection. (Therefore, use only fully charged NiMh batteries)

★ **LiFe:** By activating the LiFe cell type (LiFePO4), the cutoff voltage is reduced by 0.7V per cell. Cutoff voltage for LiFe is 2.2 to 2.7V per cell.

★ **LiPo:** Cutoff voltage is 2.9 to 3.4V per cell.

NOTE: If change "OFF" to "Slow Down" or "Cut-off", you must set battery type.

4) Cut-off Voltage:

The upper line is LiFe(2.2, 2.3, 2.4, 2.5, 2.6, 2.7),

The bottom line is for LiPo (2.9, 3.0, 3.1, 3.2, 3.3, 3.4)

5) Cells: indicating Li-Po or Li-Fe cells number.

NOTE:

★ In NiMh mode, pls do not program cells number.

★ 2 and 3 cells are recognized automatically by the ESC. That is why the cell count settings are starting with 4 cells on the ProgCard. The programming of the cell count is saved in the controller. Connecting a different cell count battery would lead to wrong under voltage detections.

★ If you change 4S or over 4S Lipo/LiFe batteries to 2S/3S LiPo/LiFe, pls firstly change battery type, then disconnect power from battery. For example, in last flight, you use a 5S LI-PO pack, now you will use 3S Li-Po pack. Firstly, choose battery type LiFe, press "Enter", you will hear a beep. Then change to LiPo. Press "Enter" button, you will hear a beep. Disconnect power of prog-card. Then re-connect power to prog-card. Wait all LEDs blink. Then you can see both Cells line shows no value. This means, progcard automatically detect the power of 3 Cells.

★ You may see both lines have value, pls refer to value you last set.

6) Special Functions:

★ **Beep short:** shortens the start beep.

★ **Rev. (Navy):** Forward and reverse activation (only for Boat ESC).

★ **Stop/Full Speed:** this is for throttle range calibration

Step1: Connect Throttle channel of receiver to progcard (right connector), via the included extension cable.

Step2: Turn on the transmitter, and put the throttle to lowest position. Choose "stop" and push the "Enter" button. Put the throttle to highest position. Choose "Full Speed" and push the "Enter" button. (Without brake)

With brake:

If we consider the throttle stick move range as 0 to 100%, usually, 0 to 10% is brake status. 10% to 100% is running status.

Therefore, put the throttle stick to 10% (about 3 notches away from 0) and set the "Stop" and 100% to set "Full Speed".

For transmitters with -100 to +100% travels you need to program -80% to +100% for calibration.

7) Special Functions: adjust F3A brake intensity.

If you require 50% brake force, put throttle stick to 1/2 position, and press the "Enter" button. For 75%, put the stick to 3/4 position, etc.

4. Now program parameters on level 2:

Push the two left buttons simultaneously, you enter LEVEL2. LED is blinking now for confirmation. (By pushing again the two left buttons you come back to level 1 exactly where you were in level 1.)

1) Act. Freewheel (FreeW. Off/ FreeW. On)

FreeW. On: allows best efficiency in certain load range, ESC remains cool.

2) Governor Mode (Gov. off / Gov. Store/Gov./fast Gov.)

It is the classical main blade speed regulation for helicopters.

★ **Gov. Store** is an extended helicopter feature, the correspondence of the throttle curve and the main blade speed is done only at the first start. It is stored so that at every later start, the main blade speed will remain exactly the same.

If you modify anything in power system, you will have to select again Gov. Store.

★ **Fast (Gov.)** can be selected along with Gov. Store and Gov. This feature increases the control loop frequency and can be used for 2pole motors, RPM over 80000/min. This function is used only if the speed control is not completely satisfactory.

The advantage is that the P and I gains can be reduced without getting a weak speed control.

NOTE:

★ Pls make sure Throttle range calibration has been done in Level 1.

★ A throttle point is corresponding to a determined head speed, which is held as long as possible for main blades.

★ For both Gov Store and Gov fast, pls **DONOT** modify the P-gain, I-gain and PWM Frequency! Otherwise, the ESC parameters would also be modified. The setting of the throttle curve should be around 60 to 80% of the full throttle ranges.

Important notice for the governor fine tuning:

The governor software default parameters are adapted to most setups. If necessary the following parameters (P and I gain) can be adjusted.

P-Gain: the proportional gain. According to this parameter, head speed variations will be regulated harder or softer.

I-Gain: the integral gain. According to this parameter, remaining head speed deviations are corrected faster or slower.

Both parameters should be adjusted simultaneously. If you can increase the P-Gain, you should also increase I-Gain, and vice versa. The adjustments on P and I should be done in small steps.

By selecting again one of the governor modes, these parameters are reset to factory default values.

3) Startup Speed: this is the rising speed for helicopters and planes.

4) PWM Frequency: With low frequencies the losses are reduced, but the motor run slightly rougher. With high frequencies, it is the opposite. The best frequency may be found in the user manual of your motor.

5) Startup Power: The higher and faster, the harder of the start. With small propellers it isn't a problem, but with large ones, it can lead to a rough startup.

After all parameters programmed, disconnect power from ESC' and Prog.Card!

Re-connect battery to ESC, it is ready to work!